

# Developing an E-Book and Other Interactive Instructional Materials for Technical Education in Vacuum Technology

## NSF New-to-ATE Project #2000454

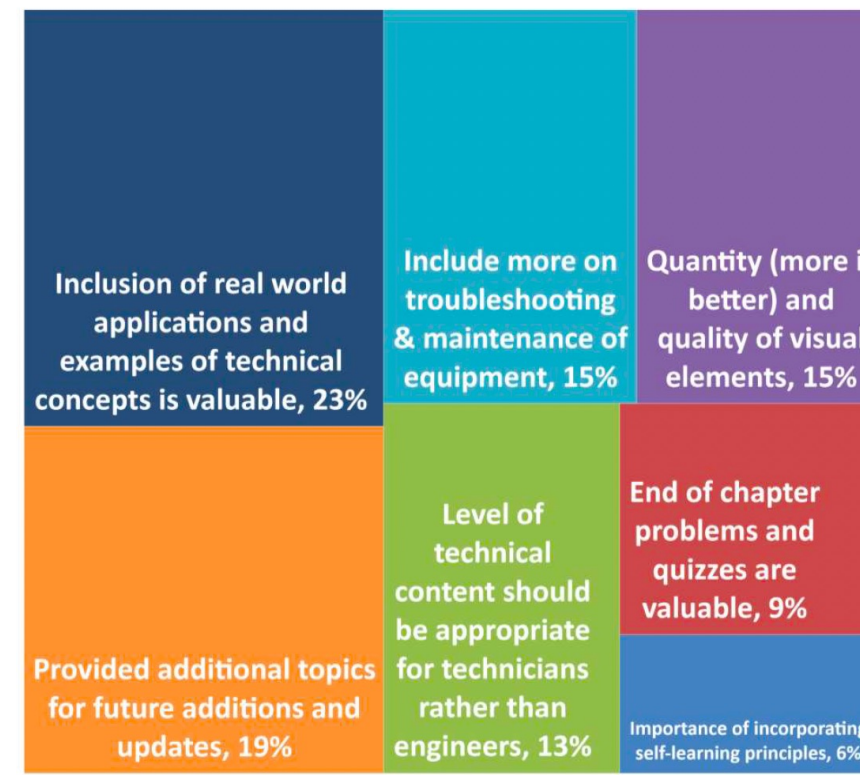
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### Project Goal

Enhance the quantity and quality of vacuum technicians through the development of open-source resources such as E-book, laboratory manual, and instructor's guide supplemented by various interactive, visual and video content suitable for technician-level education.

Common Themes From SME Reviews



### Lessons Learned

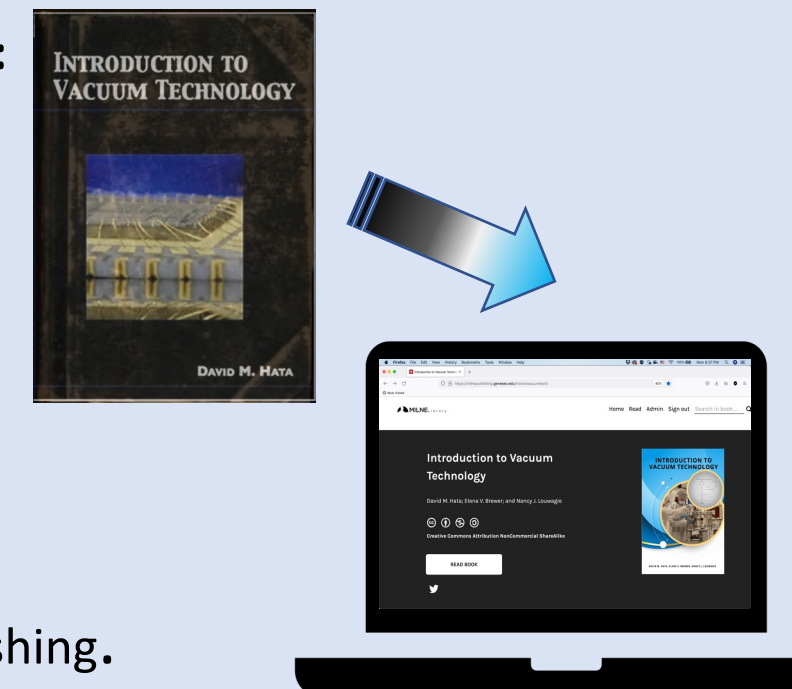
#### 1. Criteria for Selecting the E-Book Platform

##### E-Book Platform must support required functionality:

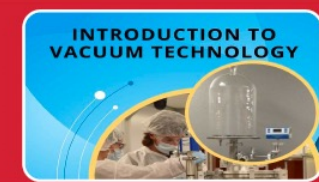
- automatically-built table of contents,
- embedded videos, animations, and simulations,
- mathematical formulas engine,
- embedded interactive quizzes,
- different publication formats (that is, on-line, PDF, HTML, EPUB, XML).

**Sustainability:** on-going availability of resources (free or low cost) after project ends

**Learning Curve:** must be manageable if new to e-publishing.

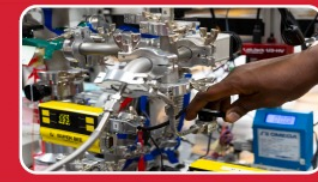


#### Project Activities – Summary of Formative Outcomes to Date



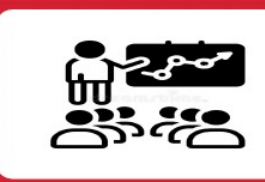
##### Develop E-Book

- Developed and piloted a 1<sup>st</sup> draft of the e-book with interactive quizzes, animations, simulations and videos
- Conducted initial SME reviews of chapters 1-4
- Identified, obtained and incorporated resources from other industry and academic partners
- Conducted initial pilot programs at NCC and ECC during spring 2022



##### Develop Lab Activities

- Ten (10) base sets of lab activities identified and prepared for pilot testing
- 1<sup>st</sup> draft to be tested fall 2022



##### Develop Instructors Guide

- Instructors guide for lab activities drafted and ready for pilot testing
- 1<sup>st</sup> draft to be tested fall 2022



##### Dissemination of Resources

- Faculty workshop scheduled for June 21-23, 2023 at Normandale Community College

#### From SMEs Reviews:

*"I like that the book is able to define things in everyday language that would be approachable to someone new to vacuum tech that does not already have a four-year science or engineering degree."*

*"The gas characteristics animations are cool and informative."*

#### From Students' Pilot Testing:

*"Great technical clarity and graphics to help illustrate the content."*

*"In my opinion this book has been more useful than many of the other textbooks I've used in recent time."*

#### Faculty Feedback:

*"Easily readable by students at this level. Liked the animations and video links provided in the electronic text."*

### Project Resources

#### E-Book Link:



SCAN ME

#### Project Website:



SCAN ME

#### Professional Development Workshop:



#### 2. Process to Incorporate SMEs Reviews

##### 10 Subject Matter Experts (SMEs) Reviewed E-Book for:

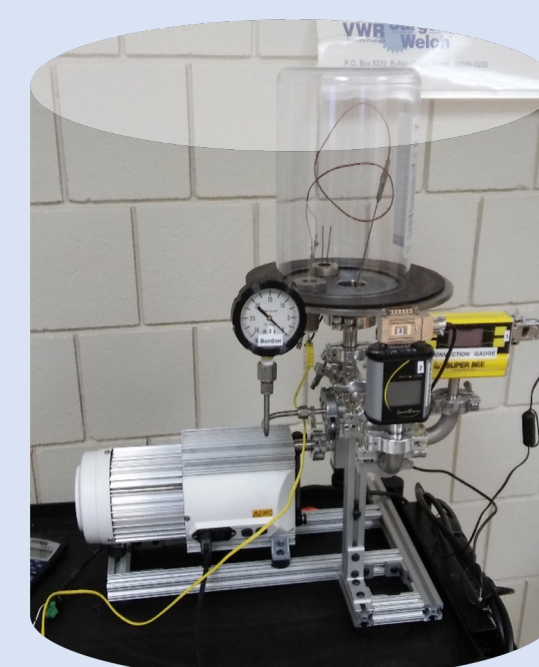
- relevance to job requirements,
- alignment to course objectives,
- quality of content and visualization elements,
- support of modern principles of learning,
- gaps in technical content.

**Feedback from SMEs was positive and provided suggestions for improving E-book. However, it took longer than planned to incorporate all feedback.**

#### 3. Plan Dissemination Workshop Early

##### Teaching Rough Vacuum Technology and Laboratory Design and Implementation (On-Site, Hands-On Professional Development Workshop):

- WHEN: May 23 or May 24, 2023 – Zoom meeting  
June 21-23, 2023 - on-site
- WHERE: Normandale Community College, Bloomington, MN
- WHO: for community college faculty
- WHAT: provides valuable hands-on experience with rough vacuum systems.



Rough Vacuum Equipment Training System



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